Aug. 21, 1989

Hello:

This is submitted for the public record of testimony in re the RCRA hazardous waste incinerator permit under consideration by Mr. C. Kelley Crossman and Mr. Richard Mitzelfelt of the NM EID.

Submitted by:

Frank W. Walker
P.O. Box 19
Ojo Sarco, NM 87550
(505-689-2322)

[Cf. next page.]

AUG 22 1989
PUBLIC HEALTH DIVISION
DIRECTOR'S OFFICE

GARBAGE MANAGEMENT IN JAPAN: LEADING THE WAY

by

ALLEN HERSHKOWITZ, PH.D.

and

EUGENE SALERNI, PH.D.

PREFACE BY MAURICE HINCHEY

8608

Aug 21, 1989

Hello. Could you please add this information to the public input of testimony on the proposed RCRA permit for the incinerator (which would burn purely chemical, hazardous waste) at Los Alamos, on which topic EID hearings were held for three days approximately 4 1/2 weeks ago. ¶ Personally, I'd like there not to be an incinerator. If the permit must be granted (and I am not saying I believe it should be granted), then please at least consider additional monitoring options, above and beyond the O_2 and CO_2 levels. Please reread the telling cross-examination by David Bates.* I feel strongly you need more information. Thanks! and God bless. Sincerely, Frank Walker.

* July 18 pp. 89-115

My address: P.O. Box 19 Ojo Sarco, NM 87550

INFORM, Inc.
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Regional Regulations

A 1974 amendment to the Basic Law for Environmental Pollution Control required that sulfur oxide emissions from municipal solid waste incinerators be established on the basis of "area regulation." The same system was applied in 1981 to emissions of nitrogen oxides. There are 24 regulated regions in Japan for SO_x and three area regulated regions for NO_x.

An "area" is a jurisdiction comprising territory from within a prefecture, and sometimes from more than one prefecture, established by the Japan Environmental Agency for the specific regulatory purpose of controlling SO_x and NO_x. Applicable regions, according to the Environmental Agency are "those [areas] where plants and businesses are clustered and it is recognized that the ambient air quality standards will not be attained by application of existing regulations alone." Area regulation requires prefectural governors, after considering health effects and technological feasibility, to establish SO_x and NO_x regulations for each of their municipal solid waste incinerators by establishing an area SO_x and NO_x limit in consultation with other governors or mayors in the area.

Area regulation was established because in some political jurisdictions the emissions standards were not sufficient to ensure air quality standards set by the national government. For facilities within an area, allowable SO_x and NO_x emissions are computed by assessing total emission sources as well as the area's meteorological and topographic features.

because "the politics are more intense." And according to JICA:

> Except in the case of sulfur oxides, the prefectural government is authorized to establish more stringent emission standards instead of the national emission standards ... [when] national ... standards are recognized to be insufficient in the specific area.

Although the national regulations for municipal solid waste incinerators include only HCl, particulates, SO_x, NO_x, and wastewater (see Table 29, page 97), the latitude that prefectures enjoy in making more stringent regulations has resulted in some incinerators being regulated for heavy metals as well. According to Mr. Kato, of the Ministry of Health and Welfare, "prefectural governments have their own, more strict regulations and so in some places more pollutants are controlled, for example, metals

Maybe we can take a hint from these people who have much more experience with this problem.

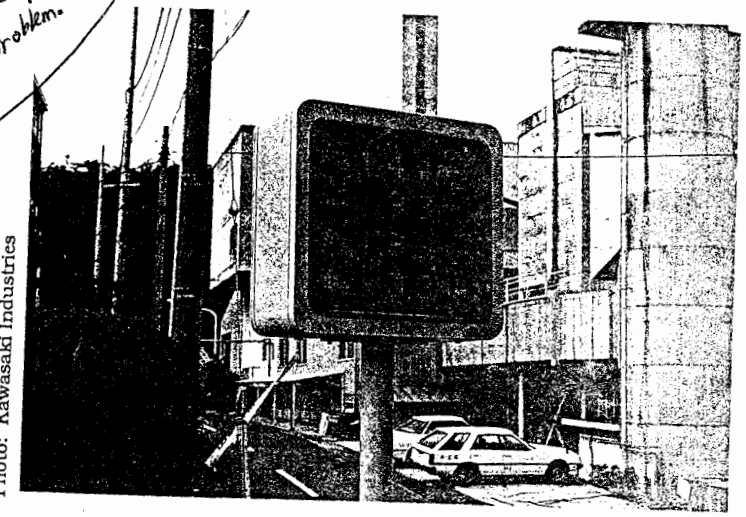
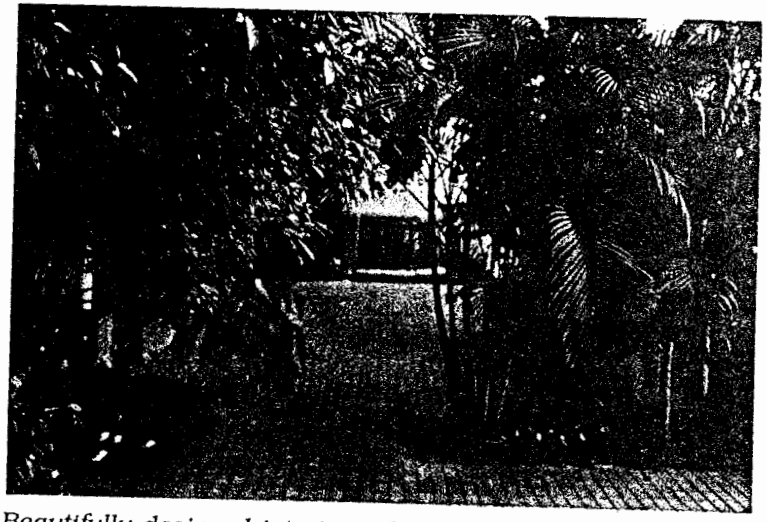


Photo: Kawasaki Industries

Citizens' concerns about permit violations are now alleviated by continuous outdoor public displays of emissions data recorded by garbage burning plants, such as the data shown on this billboard outside Kawaski's plant in Kyoto.



Beautifully designed interiors of garbage-burning plants encourage citizens to accept these facilities.

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material have been found for
although, according to Mr.
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TORING

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deteriorate, the plant can be
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reduction in plant operations

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to reduce throughput to the
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in use.

H. Ogasawara: "When an in-
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local governments or plant

indicates not only the level
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he furnace are working. All
monitor hydrogen chloride,
mperature. At three of the
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pm. All, with the exception
a monitors carbon dioxide,
or television monitors con-
furnace and the stack exit

TABLE 25 Continuous Monitoring of Pollutants and Combustion at Plants Visited by INFORM

Machida City	Temperature (calculated by 5 sensors in each furnace); O_2; NO_x; SO_x; HCl; stack opacity; ESP pressure; color TV screens continuously display inside of furnace and stack exit
Kumamoto City/ Western Plant	Temperature; O_2; NO_x*; SO_x*; HCl**; color TV continuously display inside of furnace and stack exit; automatic combustion control***
Sohka City	Temperature (2 areas of furnace); O_2; NO_x; SO_x; HCl**; Ph monitor for scrubber; color TV screens continuously display inside of furnace and stack exit; automatic combustion control***
Fukuoka City/ Eastern Plant	Temperature (3 areas of furnace); CO_2;NO_x; SO_x; HCl; color TV screens continuously display inside of furnace and stack exit
Mitaka City	Temperature (2 areas of furnace); CO_2; O_2; NO_x; SO_x; HCl**, color TV screens continuously display inside of furnace and stack exit
Ohmiya City	Temperature (2 areas of furnace); O_2; NO_x; SO_x; HCl; color TV screens continuously display inside of furnace and stack exit
Fuji City	Temperature (2 areas of furnace); O_2; NO_x; SO_x; HCl; color TV screens continuously display inside of furnace and stack exit
Yokohama Hokubu	Temperature, O_2; HCl; SO_x; NO_x; color TV screens continuously display inside of furnace and stack exit.

* Continuously displayed outside of control room because plant management states that these emissions are too low to be significant, usually being emitted at levels that are well below regulatory requirements.

** Monitor indicated "non-detectable" emissions of HCl at time of visit.

*** ACC is employed to maintain a constant steam temperature and pressure despite the temperature fluctuations that inevitably occur when burning a heterogenous fuel such as garbage. It does so by adjusting the garbage feed rate based on data provided by a "finishing-line sensor." Through the use of "burn out" weight measurements the "finishing-line sensor" calculates the average caloric value of the garbage being burned and then adjusts the garbage feed rate.

The Japanese routinely monitor all these emissions. Why can't we?

FROM: MICHAEL HORAN
P.O. BOX 2262
TAOS, NEW MEXICO 87571-2262

PLEASE RETURN TO

SAKAB

TO: RALPH KOENIG
LANL WASTE MANAGEMENT E-518

New Jersey Institute of Technology

Presents

Sweden Works: Industry in Transition

Environmental Issues

PLEASE RETURN TO:
MICHAEL HORAN
P.O. BOX 2262
TAOS, NEW MEXICO 87571-2262
TEL. 758-3522

One in a series of presentations
being made throughout the United States
in recognition of Swedish heritage

Wednesday, October 26, 1988

2 p.m.

A.J.J.A. Wilson Alumni Center

New Jersey
Institute of
Technology

Managing Hazardous Waste Through a Central Offsite Industry *)

J. A. Smedstam, President, SAKAB, S-692 00 Kumla, Sweden.

SAKAB is a Swedish company working under a government mandate for final disposal of hazardous waste, collected within the country.

Thus, today SAKAB has a central plant for final disposal of hazardous waste at Kumla, in the central part of Sweden.

SAKAB aims at covering its own costs by charging for services rendered, sale of energy and certain biproducts recovered and consultant services.

Swedish legislation on hazardous waste

Under Swedish legislation hazardous waste may be finally disposed of by:

1. SAKAB
2. Government authorised companies.

Hazardous waste can also be finally disposed locally by the industrial outfit where the waste is produced.

Collection and transport of hazardous waste is the responsibility of the municipalities and may be undertaken directly by themselves or through sub-contractors.

Hazardous Waste (HW)

Hazardous waste is defined in Sweden as materials, raw materials, products or auxiliary chemicals which have been contaminated, destroyed or forbidden or cannot, for some reason, be used for their original purpose.

---

*) Paper presented at a SWEDEN WORKS seminar on October 26th, 1988 at the Center for Hazardous and Toxic Substance Management, New Jersey Institute of Technology, Newark, New Jersey 07102, USA.

Hazardous waste can be divided into 12 main groups:

1. OIL WASTE
2. SOLVENT WASTE
3. PAINT or VARNISH WASTE
4. ADHESIVE WASTE
5. ACIDIC or ALKALINE WASTE
6. WASTE containing CADMIUM
7. WASTE containing MERCURY
8. WASTE containing ANTIMONY, ARSENIC, BARIUM, BERYLLIUM, LEAD, COBALT, COPPER, CHROMIUM, NICKEL, SELENIUM, SILVER, THALLIUM, TIN, VANADIUM or ZINC
9. WASTE containing CYANIDE
10. WASTE containing PCB
11. WASTE containing PESTICIDES, HERBICIDES, FUNGICIDES
12. LABORATORY WASTE

In addition, by special legislation CFC and BATTERIES CONTAINING MERCURY AND CADMIUM have been classified as hazardous waste.

In 1980 a survey was carried out by the National Environment Protection Board of Sweden regarding the Swedish production of hazardous waste. Thus, according to their analysis the production amounted to approximately 500 000 metric tonnes per annum, which corresponds to approximately 60 kg/person.

The relative distribution of that amount of hazardous waste was:

Oil waste	38 %
Solvent waste	7 %
Paint and varnish waste	6 %
Acidic and alkaline waste	15 %
Waste containing metals	25 %
Chemical waste	8 %
Other waste	1 %

Approximately 200 000 t/a of the produced waste could be considered as having been treated onsite by the producers. In comparison only about 40 000 t/a is currently treated by SAKAB. In addition certain special portions of the remaining amount are treated by the about 30 government authorised companies. However, unacceptable amounts of primarily energy containing HW:s still seem to disappear in an unaccountable way.

The National Environment Protection Board intends to conduct a second inquiry regarding the production of HW during 1990.

SAKAB - The procedure to undergo before start-up

The present SAKAB was established in **1976** as a result of the Government's decision to take responsibility for providing resources for final treatment of hazardous waste.

SAKAB is a joint stock company where the state owns 96% of the shares. The remaining shares are owned by the Swedish Association of Municipalities and the Industrial Foundation for Waste Treatment.

In **1978** the SAKAB Board decided to build a central plant for final treatment of hazardous waste near the township of Kumla, where SAKAB had previously in **1976** acquired 53 acres of land. Permit for the plant at Kumla was granted by the National Franchise Board for Environment Protection in December 1978.

1979 was characterized by great uncertainty. An appeal against the permit was lodged to the Government, which initiated a further investigation into alternative locations. SAKAB also applied for a permit for an alternative site on the Northern coast of Sweden.

In **1981** the Government ruled that the plant was to be sited at Kumla and concstruction could commence. The plant was brought into operation in **1983**, and the final conditions and restrictions governing operation of the plant will be set in November 1988 by the National Franchise Board for Environment Protection.

Prior to **1988** the operation has been subject to provisional conditions and has been under special supervision by the National Franchise Board for Environment Protection.

The SAKAB plant for final treatment of hazardous waste

SAKAB is situated close to the geographical centre of HW production in Sweden and benefits from good communications by road and rail. The industrial area, that surrounds SAKAB is occupied by mainly rather heavy industries. The nearest population center, the town of Kumla with about 15 000 inhabitants, is situated at a distance of 7 km.

Between 1940 and 1965 shale oil was extracted in the area. These activities have left traces in the landscape and given the local population a bad experience of industrial activities. The recipients for outgoing water are very poor. This has lead to the choice of a semi-dry method for flue-gas cleaning. After 5 years experience SAKAB has found that the available acerage for landfilling is too small and needs to be doubled.

The main units of the SAKAB plant

The SAKAB plant at Kumla consists of the following units for treatment of hazardous waste:

- Reception and storage of HW in barrels
- Unit for pre-treatment of HW in barrels

- Unit for reception and pre-treatment of HW received in tank cars and rail tank cars.
- Tank storage for pre-treated HW with tanks for blending and water separation. The tank farm contains 21 tanks on 120 m^3 each.
- The combustion plant, which consists of the feeding system for HW, the rotary kiln, the secondary combustion chamber, the flue-gas boiler and the flue-gas cleaning system.
- The plant for wet-chemical treatment of inorganic HW.
- Controlled landfills for dry metal hydroxides and slag, dust and ash from the combustion plant.
- Long-term storages for HW that has to be treated in larger batches or which has to wait for future known or today unknown treatment methods.

There are also a number of service units onsite:

- SAKABs headoffice
- Weighing station
- Unit for tank car cleaning
- Laboratory
- Workshop and garage
- District heating plant for the town of Kumla.

SAKAB is presently constructing:

- A unit for waste water treatment
- A destillation unit for solvent recovery.

Up to mid 1988 totally approx. US$ 45 millions have been invested in the plant.

Control of Hazardous Wasted received

HW RECEIVED BY SAKAB IN 1987

1.	OIL WASTE	10 508 metric tons
2.	SOLVENT WASTE	6 683 "
3.	PAINT and VARNISH WASTE	7 853 "
4.	ADHESIVE WASTE	204 "
5.	ACIDIC and ALKALINE WASTE	1 723 "
6.	WASTE containing CADMIUM	22 "
7.	WASTE containing MERCURY	143 "
8.	WASTE containing HEAVY METALS	8 317 "
9.	WASTE containing CYANIDE	121 "
10.	WASTE containing PCB	478 "
11.	WASTE containing PESTICIDES, etc	535 "
12.	LABORATORY WASTE	43 "
13.	OTHER HW:s	1 084 "
TOTAL		37 714 metric tons

All incoming HW is weighed and checked in comparison with previously submitted declaration reports. In 1987 SAKAB handled 25 000 individual declaration reports. At arrival HW for incineration is first of all tested in the laboratory. This compulsory test includes e.g.: effective thermal value, water-content, sulphur, chlorine, fluor, sodium, potassium, PCB, chlorphenols and the sum of organic compounds.

Furthermore should be noted that incineration clearance can only be issued by a qualified chemist well acquainted with the combustion process.

Control of drums occurs by a statistical sampling procedure. In 1987 SAKAB received 41 000 drums containing HW. Sampling and analysis are done on all HW received by bulk transport.

Pre-treatment of HW in barrels

All HW intended for incineration and delivered in barrels must be pre-treated. Liquid HW is removed by suction and transferred to holding tanks. If only a small amount of sediment remains at the bottom of the barrel, the drum will be transported onto storage lines prior to incineration. The empty barrels are used as load carriers for minor packages or containers that can be incinerated without emptying. Barrels containing sediment or semi-solid HW can be emptied into a dispersion unit where the HW undergoes mechanical treatment and is dispensed in warm waste oil. The resulting sludge is then pumped into holding tanks.

During the winter time the majority of the barrels have to be heated prior to emptying. This can be done in five heating chambers with a total holding capacity of 600 barrels.

The incineration unit

Hazardous Waste which is incinerated consists mainly of the following types:

- Oil waste
- Solvent waste
- Paint and varnish waste
- Adhesive waste
- Waste containing PCB
- Waste containing pesticides, herbicides, etc.
- Hazardous chemical residues

The incineration plant is designed to handle about 33 000 metric tons of HW per year.

The three most important requirements for efficient and environmentally safe incineration are:

- High and well controlled combustion temperature
- Sufficiently long gas detention time at a high temperature
- Well mixed excess air, i.e. well developed turbulence.

Our combustion system is specially designed to meet these requirements. Thus, the system is composed of:

- Feeding system
- Control unit
- Rotary kiln
- Secondary combustion chamber
- Exhaust gas boiler
- Flue gas cleaning system
- Chimney stack

The HW is introduced through the fixed front wall adjacent to the rotary kiln by means of burners and lances for waste oil, solvents, waste water, sludge and PCB as well as feeding locks for drums and solid HW. The primary air-intake is also located in the front wall. The rotary kiln is 12 m long and has an internal diameter of 4.5 m. The inside of the rotary kiln and secondary combustion chamber is coated with refractory bricks.

The combustion temperature in the rotary kiln, as measured on the infrared pyrometer is a minimum of 1200°C - 1400°C. Combustion must result in a molten slag formed at the outlet of the rotary furnace. The melted slag is poured out down to the bottom of the secondary combustion chamber into a slag-quenching basin. It is then transported by belt into containers and further to a controlled lime-enriched landfill.

From the rotary kiln the gases are diverted to the secondary combustion chamber, where secondary and tertiary air are admitted in order to provide complete combustion. The temperature in the secondary combustion chamber is controlled by using oil burners.

The flue gases then pass through the exhaust gas boiler, where some of the heat contained in the exhaust gases is utilized for the generation of steam. This steam (approx. 20 t/h) is used in the generation of electricity in a back-pressure turbine, for heating our own buildings and as an energy supply source (approx. 50 GWh/a) for Kumla's district heating plant.

Having passed through the steam generator, the flue gases are first cleaned in a scrubber and then in the following electrostatic precipitator. The process involves leading the flue gases into a reaction tower, where lime wash is added and atomized by a rotating spreader disc. The contents of HCl, HF and SO_2/SO_3 in the hot flue gases react with the drops of lime solution at the same time as the water evaporates. The reaction product is balanced to come out dry. It is partly removed at the bottom of the reaction tower and partly in the electrostatic precipitator.

The cleaned flue gas is diverted into a 60 m high chimney stack.

The dust which has been removed is stored temporarily in a residual products' silo before it is taken to a special landfill. The flue gas cleaning has been designed so as to meet the following values of emission to the air (monthly values):

Dust	<20 mg/Nm^3
HCl	<100 mg/Nm^3
HF	<5 mg/Nm^3

These values refer to dry flue gases containing 10% of CO_2. The efficiency of combustion is decided to be minimum 99,9%.

The efficiency of combustion is defined as:

$$EC = \left(1 - \frac{CO}{CO_2} \right) \cdot 100$$

The values of emission are monitored on two independent systems due to the requirements of the National Franchise Board of Environment Protection. The values which are logged in a computer are regularly reported to the authorities.

Wet-chemical treatment

SAKAB treats spent acids, liquids from surface treatment baths, liquids containing heavy metals, and salts in the wet-chemical plant.

The purpose of this treatment is to neutralize the HW and transform the heavy metals into insoluble forms to be separated from the water through a filtering process. The end products consist of purified water which normally is released into the recipient and filter cakes containing heavy metals subsequently placed in controlled landfills.

Controlled landfills

Since 1978 SAKAB has landfilled HW containing heavy metals as solid metal hydroxides and, since 1983, ashes and dust originating from high temperature incineration of HW as well. Our controlled landfills consist of sealed cells above ground level. The reasons for using this type of landfill are that it is easy to repair and control, and also that it facilitates any future recovery of components in the waste.

SAKAB landfills 4000 m^3 of ashes and 7000 m^3 of metal hydroxides per year. The metal hydroxides are, besides at Kumla, landfilled on three different sites in the country.

E.g. SAKAB received rather negative press-coverage during the period of establishment of the plant. Out of approx. 1400 newspaper articles published in 1979 only 10 were positive to SAKAB's establishment.

Active local action groups were accordingly formed that opposed SAKAB during the establishment stage. The debate was often aggresive. It was also sometimes directed against individuals. With increasing environmental concern and understanding for the problems that improper handling of HW can cause, the attitude of the press towards SAKAB has nowadays changed, though. Most of the attention today given to SAKAB is less negative, although, not particularly positive.

The fact that the operation of the plant has not brought the devastating consequences to the surrounding area that was predicted has also made the local opposition less intense. During the establishment period the combustion of, among other things, PCB was associated to the forming of dioxines and furanes, the presence of which in many combustion processes then were only vaguely known by researchers. It used to be a frequent and general phenomenon in those early days to associate SAKAB with dioxines. We have slowly managed to improve our image by now.

There is still a local action group opposed to SAKAB , whose objective of which is that the activity of the plant must be gradually decreased and established elsewhere.

To ensure that the general public has the opportunity to discuss SAKAB's activity and obtain information direct from us two groups have been formed:

- a consultative group
- a local neighbourhood group.

The following organizations are represented in the consultative group:

- The Örebro County Branch of the Farmers' Association
- The Hjälmaren Fishermens' Association
- The Sports Fishermen of the Örebro County
- The Hjälmaren Water Conservancy
- The Örebro County Property Owners' Association
- The Örebro Tennants' Association
- The Närke-province Environment Protection Organization *)
- The Working Group Against SAKAB at Kumla
- The Örebro County branch of the Swedish Trade Union Confederation
- The Örebro County branch of the Swedish Central Organization of Salaried Employees
- The Swedish Confederation of Professional Associations-/The National Federation of Government Officers
- The Swedish Employers' Confederation

Economy

SAKAB's activity is financed through service payments from the HW-producer entrusting his HW to SAKAB for destruction. The fee for e.g. the combustible products depends on their consistency, heat value and contents of halogens and sulphur. Toxic waste, which must be handled using extra precaution is subject to surcharge.

To exemplify, some current price levels are:

Waste oil	US$ 7 - 100 /T
Solvents. paints, varnishes, etc.	" 300 - 700/T
PCB	" 3000 - 5000/T
Pesticides	" 3000/T

---

*) Note. The Örebro County is approx. = the Närke province. The city Örebro, 17 km from SAKAB, has 120.000 inhabitants. It is the capital of the county.

The total income for 1988 is estimated to US$ 16 million. This exceeds slightly the sum of the capital and operation costs of the plant plus some development expenditures.

SAKAB from today to the year 2000

A project aimed at producing a reliable estimate regarding resources needed for qualified treatment of the in-flow of HW during the next ten years was launched by SAKAB, early 1987. According to statements by Swedish Industry, we were told that production of Hazardous Waste is unlikely to increase appreciably during this period. As the demands for environmentally safe treatment increase, the costs for getting rid of the HW will increase simultanously. This will undoubtedly stimulate measures to minimize the production of HW. However, on the other hand stricter requirements by the authorities, intensified control, as well as increased environmental concern, are expected to render still larger HW-volumes collected and, thus, a further potential for environmentally safe treatment. The landfill of HW should for example decrease in favour of high temperature incineration. Improved treatment of industrial outlets to air and water should produce more concentrated waste, which will be classified as hazardous.

Legislation in order to limit or prevent the use of some chemicals will probably create new needs of treatment.

Sweden has few known old dumps or landfills, which need to be cleaned up. Increased environmental concern, media exposure and control by the authorities may necessitate, however, the establishment of additional resources for treatment of soil and sludge containing creosote, pesticides, mercury and arsenic.

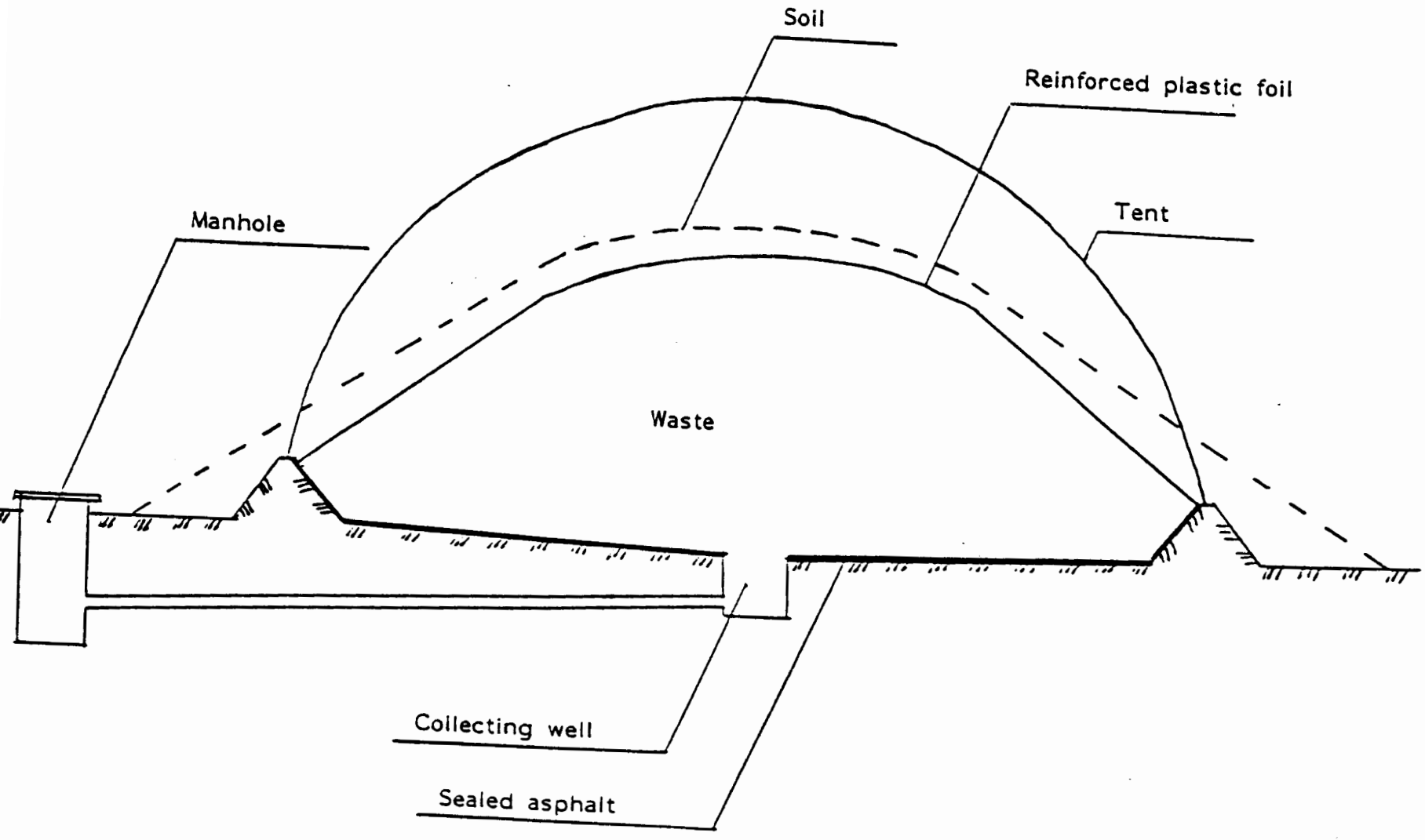
The SAKAB project previously mentioned concluded that it will shortly be necessary to double our current incineration capacity.

In October this year the Board of SAKAB recognized this need and therefore entrusted the company president with preparing an application for permit for an additional incineration unit of at least the same capacity as the existing one. Thus, a second new unit could possibly be taken into operation by 1993. Taking into account our exhaustive and positive experiences from production and tests in our existing plant, the No. 2 combustion system will also be based on a rotatary furnace. The design of the pre-treatment and flue-gas cleaning systems will, however, both have to differ considerably from their present designs.

The emission conditions laid down by the authorities are expected to become stricter. For example, the maximum emission level of dioxines will probably have to be <0,1 ng/Nm^3 flue gas. Through SAKAB's knowledge of running an operation of this nature, we envisage no problems, however, in adhering to these new conditions.

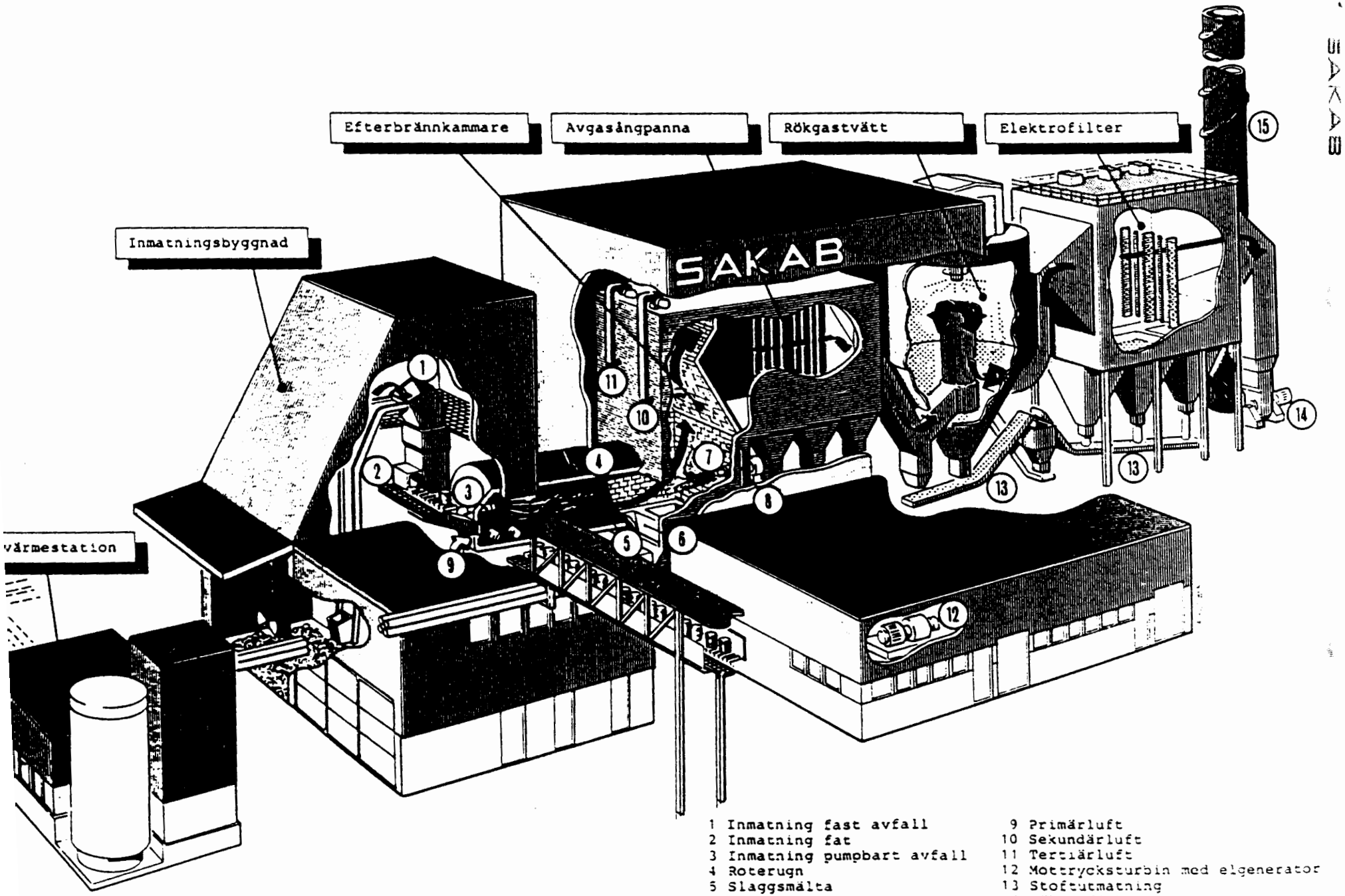
E N D

The "SAKAB" landfill"



Fjärrvärmestation	=	District heating station
Inmatningsbyggnad	=	Input building
Efterbrännkammare	=	Post-combustion chamber
Avgasångpanna	=	Exhaust gas boiler
Rökgastvätt	=	Flue gas cleaning
Elektrofilter	=	Electrostatic precipitator

1 Solid waste input
2 Drum input
3 Pumpable waste input
4 Rotary kiln
5 Slag smelter
6 Slag quenching bath
7 Oil burner
8 Contaminated water input
9 Primary air
10 Secondary air
11 Tertiary air
12 Back-pressure turbine
13 Dust discharge
14 Flue gas fan
15 Chimney stack



1 Inmatning fast avfall
2 Inmatning fat
3 Inmatning pumpbart avfall
4 Roterugn
5 Slaggsmälta
6 Slaggsläckningsbad
7 Oljebrännare
8 Inmatning förorenat vatten
9 Primärluft
10 Sekundärluft
11 Tertiärluft
12 Mottrycksturbin med elgenerator
13 Stoftutmatning
14 Rökgasfläkt
15 Skorsten

SAKAB